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developed on September 24, 1889, immediately after exposure. A and B were developed at Cayenne on December 22, 1889. E and F were developed at the Lick Observatory on the same day. C and D were returned undeveloped to the Lick Observatory (arriving there March 5, 1890). G and H (still undeveloped) and C and D were then re-standardized by Mr. BARNARD (March 16th), and all four were developed together March 17th. Thus, a complete history of the changes of these plates is available; and it is possible that a numerical factor can be obtained by which to multiply the measures of brightness obtained directly from the plates taken at Cayenne, to obtain the results which they would have given, had the eclipse occurred at Mt. Hamilton.

The practical result of this interesting experiment is to show that plates which are to be exposed in a damp climate should be hermetically sealed until they are exposed, and again sealed immediately afterwards. The agreement between the results of Mr. PICKERING'S measures and those of December, 1889, shows that both are erroneous. The measures on the plates of January, 1889, are to be taken as correct, for the present, at least.

NOTICES FROM THE LICK OBSERVATORY.

PREPARED BY MEMBERS OF THE STAFF.

INTERNATIONAL CONGRESS OF CELESTIAL PHOTOGRAPHY.

The International Astro-Photographic Congress, which met at Paris in 1888, is now divided into two parts. The first is concerned with the production of the stellar charts of the whole sky; the work of the second relates to the application of photography to the study of the physical conditions of the sun and stars. The first section publishes a *Bulletin* of which four parts (in quarto) have already appeared. The second section has just printed the *Procès-verbaux* of its meetings in September, 1889, and a summary of this important document follows.

Thirty-nine of the sixty-six members of the Congress were present at the sessions, and joined in discussions of the varied questions brought before the meeting. The President, M. JANSSEN, in his opening address, briefly reviewed the field of work, which was then considered in detail. The conclusions of the Congress are here summarized:

Photography of the Sun. It was voted that solar photograms, to be used either for precise measures or for mere statistics of the spots, should be of one size, and a solar image of one decimeter in diameter (3.94 inches) was recommended.

It was recommended that photographs destined for the statistical study of the solar spots should be made at as great a number of observatories as possible, so that, on the average, several negatives should be available each day.

It was voted that the Congress recommends a comparative study of the solar spots and of terrestrial magnetism.

It was voted that the Congress calls the attention of observers to the great present importance of obtaining solar photograms on a large scale at as many stations as possible. A solar diameter of three decimeters (11.8 inches) should be considered as the minimum size of such photograms, taken either for the study of the photosphere, for the determination of the distribution of spots, faculæ, etc., or for the detection of the transits of small bodies revolving about the sun.

It was recommended that the solar spectrum should be studied photographically, and that this study ought to be extended to the invisible portions of the spectrum; and, also, that a study of the atmospheric solar spectrum should be made for different altitudes of the sun. It was also recommended that observers should study the spectrum of the solar corona by photography (without an eclipse,—*i. e.*, in full daylight).

Photography of the Moon. It was recommended that observatories should secure series of lunar photographs, endeavoring to have as many pictures as possible for the whole duration of a lunation, so as to be able to deduce from them the true topographical features of our satellite. Enlargements were also recommended.

Photography of Planets, Comets, etc. The Congress recommended the study of planets by photography; and encouraged the study of methods for the photography of meteors and shooting stars. With regard to comets, the Congress recommended that they should be photographed so as to obtain a series of images during the whole course of their apparition, and insisted upon the importance of detailed photographs of the heads of such bodies.

Photography of Clusters. It was recommended that clusters of stars should be photographed, as well for the purpose of precise measures of position as for descriptive purposes, and that for such

photographs the processes prescribed for the international charts should be adhered to.

Photometry of Stars. M. JANSSEN described his method for determining the brightness of stars, as follows: The method depends on the proposition that the brilliancies of two lights are inversely proportional to the times required for the two lights to stain a sensitive plate to a given amount,—that is to say, to accomplish equal photographic effects. To apply the method to the stars, a plate is placed *beyond* the stellar focus of the telescope, so as to obtain the diluted disc or circle of the star. This operation is to be repeated a number of times with different exposures for each of the two stars to be compared. The plates for the two stars are to be developed together, and, finally, a diluted disc of star A must be found which will match in intensity some diluted disc of star B. The relative brilliancies of the two stars are, according to M. JANSSEN, inversely proportional to the times of exposures.

Photography of Spectra. The Congress recommended that comparisons should be made between the spectra of the sun and of the stars, using the lunar spectrum as a term of comparison.

Photography of Nebulæ. The Congress recommended, 1st, that photographs of nebulæ should be taken so that they may be comparable with future photographs; and that to this end the most suitable methods should be adopted, notably the method of *diluted discs* (see above); 2d, that methods should be devised for the discovery of nebulæ by photography; 3d, that observatories should prepare “documents,” such that any modifications which the negatives may suffer can, in the future, be detected.

Instruments to be Used. The Congress advises that special instruments should be employed for each class of researches; and recommends, in general, reflectors for the photography of nebulæ and comets, and refractors of long focus for the study of clusters and of planets, etc.

Preservation of Negatives, etc. M. JANSSEN stated that negatives on collodion were preserved, at Meudon, by covering them with plain glass, and fastening the two pieces of glass together with lead bands, and the Congress recommended this process for the preservation of negatives, etc.

The Congress also recommended that the negatives obtained by an observatory should, in general, be preserved at that observatory;

but that a certain number of copies should be carefully made (for deposit at certain central bureaus).

The Congress voted that in order to determine the solar parallax, it was of the highest interest to photograph the asteroids at their favorable oppositions.

It was further voted that non-photographic spectroscopy should be included in the subjects of consideration, and that in future the title of the Congress should be *Congrès de Photographie et de Spectroscopie Célestes*.

The adjournment of the session took place on September 26th.

E. S. H.

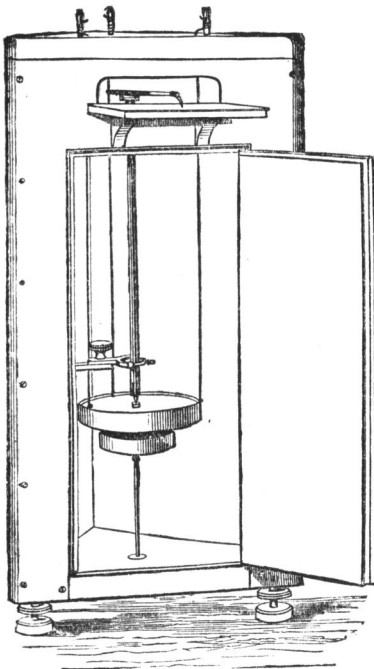
EARTHQUAKE OBSERVATIONS.

The desirability of obtaining accurate records of earthquake disturbances has long been recognized. Services for this purpose are organized in Italy, Switzerland, Japan and California. For the service in California inexpensive but entirely efficient instruments have been

made by copying the Duplex Seismometer, which Professor EWING invented for Japan.

Mr. MATEO CLARK, of London, a member of the Society, has recently presented earthquake instruments of this description to the Observatories of Mexico, Santiago de Chili, Cordoba and Greenwich. It is hoped, if these instruments prove to be as satisfactory in their new situations as they have been in California, that they may lead to the establishment of a regular system of such stations in the different countries.

The California system includes two complete seismometric stations, at Berkeley and at Mount Hamilton, and duplex instruments (like the cut) at two points in San Francisco, at Chabot Observatory (Mr.



DUPLEX SEISMOMETER.
(By the courtesy of *Nature*.)

BURCKHALTER), at Mr. BLINN'S private observatory in East Oakland,